SECTION 2
510(k) SUMMARY

JAN 0 9 2013

This summary of 510(k) safety and effectiveness information is being submitted in accordance with the requirements of 21 CFR 807.92. The information provided is consistent with FDA recommendations cited in Appendix B – The 510(k) Summary Document Requirements from the draft guidance document entitled, "The 510(k) Program: Evaluating Substantial Equivalence in Premarket Notifications [510(k)]" (Dec. 27, 2011).

A. 510(k) Number:

K122062

B. Purpose of Submission:

Device Modification to K102911: Change in formulation of the Target Capture Reagent (TCR) used in APTIMA Trichomonas vaginalis (ATV) Assay, and use of the PANTHER System as a platform.

C. Measurand:

Ribosomal RNA from *Trichomonas vaginalis*

D. Type of Test:

Nucleic acid amplification test

E. Applicant:

Gen-Probe Incorporated
10210 Genetic Center Drive
San Diego, CA 92121
(858) 410-8000

Company Contact:	Ma. Carmelita S. Baluyot Regulatory Affairs Specialist
Phone:	858-410-8309
Fax:	858-410-9028
Email:	carmelita.baluyot@gen-probe.com
Date Prepared:	December 18, 2012

F. Proprietary and Established Names:

APTIMA Trichomonas vaginalis Assay

G. Regulatory Information

1. Regulation Section
   21 CFR 866.3860
2. Classification
   Class II
3. Product Code
   OUY – *Trichomonas vaginalis* nucleic acid amplification test system
4. Panel
   83 – Microbiology

H. Intended Use

1. Intended Use
   The APTIMA Trichomonas vaginalis Assay is an *in vitro* qualitative nucleic acid amplification test (NAAT) for the detection of ribosomal RNA (rRNA) from *Trichomonas vaginalis* to aid in the diagnosis of trichomoniasis using the PANTHER System.

   The assay may be used to test the following specimens from symptomatic or asymptomatic women: clinician-collected endocervical swabs, clinician-collected vaginal swabs, and specimens collected in PreservCyt Solution.

2. Indications for Use

   The APTIMA Trichomonas vaginalis Assay is an *in vitro* qualitative nucleic acid amplification test (NAAT) for the detection of ribosomal RNA (rRNA) from *Trichomonas vaginalis* to aid in the diagnosis of trichomoniasis using the PANTHER System.

   The assay may be used to test the following specimens from symptomatic or asymptomatic women: clinician-collected endocervical swabs, clinician-collected vaginal swabs, and specimens collected in PreservCyt Solution.

3. Special conditions for use statement

   For prescription use

4. Special instrument requirements

   The automated PANTHER System

I. Device Description

The ATV Assay with the modified TCR, referred to as ATV Assay (Version 2) in this submission is the subject of this premarket notification. The ATV Assay (Version 2) is similar to the ATV Assay originally cleared (ref: K102911), except for the formulation of the TCR. The TCR is a HEPES-buffered solution containing lithium salts and derivatized magnetic beads. A second target capture oligo was added to the TCR formulation in order to accommodate future specimen types.

The TCR modification did not result in the change of assay technology. The ATV Assay (Version 2) uses Target Capture (TC), Transcription Mediated Amplification (TMA), and Hybridization Protection Assay (HPA) technologies to qualitatively detect ribosomal RNA (rRNA) from *Trichomonas vaginalis*. The overall assay design as well as the assay procedural steps remain unchanged from that previously described in the original 510(k) for the ATV Assay (K102911).

The ATV Assay (Version 2) kit is comprised of 3 boxes:

1. Refrigerated Box – Contains the Amplification Reagent, Enzyme Reagent, Probe Reagent and Target Capture Reagent-B
2. Room Temperature Box – Contains Amplification Reconstitution Solution, Enzyme Reconstitution Solution, Probe Reconstitution Solution, Selection Reagent and Target Capture Reagent
3. Controls Box – Contains the Negative and Positive Controls

The ATV Assay (Version 2) on PANTHER would utilize three specimen collection kits. These collection kits were cleared for use with the originally cleared ATV Assay and other commercialized APTIMA Assays.

1. APTIMA Unisex Swab Specimen Collection Kit for Endocervical and Male Urethral Swab Specimens
2. APTIMA Vaginal Swab Specimen Collection Kit
3. APTIMA Specimen Transfer Kit

Instrumentation

The ATV Assay (Version 2) was validated using the PANTHER System, which was previously cleared in May 2012 (Ref: K111409).

J. Substantial Equivalence Information:

A. Predicate Device Name:

APTIMA Trichomonas vaginalis Assay on TIGRIS

B. Predicate 510(k) Number:

K102911

C. Comparison with Predicate:

Similarities		
Item	**ATV Assay (Version 2) Device**	**ATV Assay (K102911)** Predicate
Device Class	2	same
Qualitative /Quantitative Assay	Qualitative	same
Intended Use	NAAT test for detection of *Trichomonas vaginalis* ribosomal RNA (rRNA)	same
Technology	Target Capture(TC) Transcription Mediated Amplification(TMA) Hybridization Protection Assay (HPA)	same

Differences		
Item	**ATV Assay (Version 2) Device**	**ATV Assay (K102911) Predicate**
Formulation	Original Formulation plus additional oligo in TCR	Original Formulation
Platform	PANTHER	TIGRIS
Specimen Types	Three (3) Female specimen types: • Vaginal swab • Endocervical swab • ThinPrep in PreservCyt solution	Four (4) Female specimen types: • Urine • Vaginal swab • Endocervical swab • ThinPrep in PreservCyt solution

K. Standard/ Guidance Document Referenced

EN 13640:2002 – Stability Testing of In-Vitro Diagnostic Medical Devices

EP5-A2, 2004 – Evaluation of Precision Performance of Quantitative Measurement Methods, CLSI Approved Guideline

EP15-A2, 2006 – User Verification of Performance for Precision and Trueness, CLSI Approved Guideline

EP07-A2, 2005 – Interference Testing in Clinical Chemistry, Approved Guideline

Format for Traditional and Abbreviated 510(k)s – Guidance for Industry and FDA Staff, August 2005

General Principles of Software Validation, Final Guidance for Industry and FDA Staff, January 2002

The 510(k) Program: Evaluating Substantial Equivalence in Premarket Notifications [510(k)], Draft Guidance for Industry and FDA Staff, Dec. 27, 2011.

L. Test Principle

The ATV Assay involves 3 main steps which take place in a single tube: target capture (TC), target amplification by Transcription Mediated Amplification (TMA) and detection of the amplification products (amplicon) by Hybridization Protection Assay (HPA). Specimens to be tested are collected and transferred into their respective specimen transport tubes. The transport solutions in the specimen transport tubes release the rRNA targets and protect them from degradation. When the TV assay is performed, the target rRNA is isolated from the specimen by use of capture oligomers via target capture that utilizes magnetic particles. When target capture is complete, the TV rRNA is amplified via TMA. Detection of the amplicon is achieved by HPA using single stranded nucleic acid probes with chemiluminescent labels that are complimentary to the amplicon. During the detection step, light emitted from the labeled RNA: DNA hybrids is measured as photon signals in a luminometer and are reported as Relative Light Units (RLU).

M. Performance Characteristics

1. Analytical Performance

   a. Precision/Reproducibility

   The precision of the ATV Assay (Version 2) on PANTHER was evaluated in-house by multiple operators who performed multiple runs over multiple days with three different reagent lots on three different PANTHER Systems.

A 4-member reproducibility panel was prepared in PreservCyt (ThinPrep) liquid cytology specimen-STM matrix (1:2.9). PreservCyt sample pools were screened with the ATV Assay to confirm that *T. vaginalis* was not present. The pools were then spiked with *T. vaginalis* lysate to produce high negative (expected positivity: >0% and <100%), moderate positive (expected positivity: 100%) and high positive (expected positivity: 100%) panel members. Unspiked PreservCyt pools served as the negative panel members. The reproducibility panels were tested in triplicate by 3 operators, in 2 runs per day using 3 reagent lots on 3 instruments. Testing was performed over 13 days.

The negative and positive panel members (panel members 1, 3, and 4) yielded ≥99% agreement with the expected results as shown by the following chart. The results from this study demonstrate that the ATV Assay can be performed reproducibly on the PANTHER System.

Description	Panel Member	TV/mL	Valid N	% Positive	% Agreement
Negative	1	0	162	0.0	100% (97.7 - 100)
High Negative	2	0.003	162	11.1	N/A
Moderate Positive	3	0.02	162	99.4	99% (96.6 -99.9)
High Positive	4	1	162	100.0	100% (97.7 - 100)

N/A = not applicable, expected positivity was 5% to 95%.
N= 162 for each panel member

b. Assay reportable range

The ATV Assay (Version 2) is designed for and validated on the PANTHER System. The assay test results are automatically interpreted by the PANTHER System APTIMA Trichomonas vaginalis software. A test result may be negative, positive or invalid as determined by the total Relative Light Units (RLU) in the detection step. A test result may be invalid due to RLU values outside the normal expected ranges. Initial invalid results should be retested.

Test Interpretation	Total RLU (x 1000)
Negative	0* to <100
Positive	100 to <2400
Invalid	0* or >/= 2400

*If the RLU measured on the PANTHER System is between 0 and 999, a result of "0" is reported in the "Total RLU (000s)" column in the run report. Measured RLU values less than 690 are reported as invalid. RLU values between 690 and 999 are reported as valid.

c. *Traceability, Stability, Expected Values (controls, calibrators or methods)*

Data to support the recommended shipping and storage conditions for the vaginal swab and PreservCyt liquid Pap were generated with negative clinical specimens spiked with *T. vaginalis*. Greater than 98% positivity was observed in both matrices at all times and temperatures tested confirming the validity of the claimed maximum storage times and temperatures.

Quality Control Results and Acceptability

The APTIMA Negative Control for *Trichomonas* and APTIMA Positive Control for *Trichomonas* act as controls for the target capture, amplification and detection steps of the assay. The Positive Control contains non-infectious *Trichomonas vaginalis* rRNA.

The ATV Assay Controls must produce the following test results:

Control	**Total RLU (x1000)**	***Trichomonas vaginalis* Result**
Negative Control	0* and <20	Negative
Positive Control	>/=500 and < 2400	Positive

*If the RLU measured on the PANTHER System in between 0 and 999, a result of "0" is reported in the "Total RLU (000s)" column in the run report. Measured RLU values less than 690 are reported as invalid. RLU values between 690 and 999 are reported as valid.

d. *Analytical Specificity*

Specificity of the ATV Assay (Version 2) was evaluated by testing various microorganisms, including common flora of the genitourinary tract, opportunistic organisms, and closely related organisms. Testing was conducted in specimen transport media (STM) and PreservCyt in STM with 25 replicates of each isolate. The list of organisms and the concentrations tested are provided in **Table 1**. No cross-reactivity or significant effect on ATV Assay specificity was observed with any of the organisms tested.

The ATV Assay (Version 2) was also evaluated by testing the same organisms (**Table 1**) in STM and PreservCyt in STM spiked with *T. vaginalis* lysate to a final concentration of 0.01 TV/mL (25 replicates of each isolate). The ATV Assay was not significantly affected by the presence of the microorganisms tested, except in the presence of *Trichomonas tenax* and *Pentatrichomonas hominis* (where lower signal outputs were observed). *T. tenax* is a commensal of the oral cavity and *P. hominis* is a commensal of the large intestine.

Table 1 – Microorganisms tested with ATV Assay on PANTHER

Microorganism	Concentration	Microorganism	Concentration
Acinetobacter lwoffi	$1x10^6$ CFU/mL	HPV 16	$2.5x10^6$ copies/mL
Actinomyces israelii	$1x10^6$ CFU/mL	HPV 6	$2.5x10^6$ copies/mL
Atopobium vaginae	$1x10^6$ CFU/mL	*Klebsiella pneumoniae*	$1x10^6$ CFU/mL
Bacteroides fragilis	$1x10^6$ CFU/mL	*Lactobacillus acidophilus*	$1x10^6$ CFU/mL
Bifidobacterium adolescentis	$1x10^6$ CFU/mL	*Lactobacillus crispatus*	$1x10^6$ CFU/mL
Campylobacter jejuni	$1x10^6$ CFU/mL	*Listeria monocytogenes*	$1x10^6$ CFU/mL
Candida albicans	$1x10^6$ CFU/mL	*Mobiluncus curtisii*	$1x10^6$ CFU/mL
Chlamydia trachomatis	$1x10^6$ IFU/mL	*Mycoplasma genitalium*	$2.5 x10^6$ copies/mL
Clostridium difficile	$1x10^6$ CFU/mL	*Mycoplasma hominis*	$1x10^6$ CFU/mL
Corynebacterium genitalium	$1x10^6$ CFU/mL	*Neisseria gonorrhoeae*	$1x10^6$ CFU/mL
Cryptococcus neoformans	$1x10^6$ CFU/mL	*Pentatrichomonas hominis*	$1x10^6$ cells/mL
Cytomegalovirus	$2x10^5$ $TCID_{50}$/mL	*Peptostreptococcus magnus*	$1x10^6$ CFU/mL
Dientamoeba fragilis	$1x10^6$ CFU/mL	*Prevotella bivia*	$1x10^6$ CFU/mL
Enterobacter cloacae	$1x10^6$ CFU/mL	*Propionibacterium acnes*	$1x10^6$ CFU/mL
Enterococcus faecalis	$1x10^6$ CFU/mL	*Proteus vulgaris*	$1x10^6$ CFU/mL
Escherichia coli	$1x10^6$ CFU/mL	*Pseudomonas aeruginosa*	$1x10^6$ CFU/mL
Gardnerella vaginalis	$1x10^6$ CFU/mL	*Staphylococcus aureus*	$1x10^6$ CFU/mL
Haemophilus ducreyi	$1x10^6$ CFU/mL	*Staphylococcus epidermidis*	$1x10^6$ CFU/mL
Herpes simplex virus I	$2x10^5$ $TCID_{50}$/mL	*Streptococcus agalactiae*	$1x10^6$ CFU/mL
Herpes simplex virus II	$2x10^5$ $TCID_{50}$/mL	*Trichomonas tenax*	$1x10^6$ cells/mL
HIV-1	$2.5x10^6$ copies/mL	*Ureaplasma urealyticum*	$1x10^6$ CFU/mL

e. Interference

The following substances were individually spiked into STM and PreservCyt in STM for a final concentration of 1% (vol/vol or wt/vol): personal lubricants, personal deodorants, spermicides, anti-fungals, intravaginal hormones, porcine gastric mucus, seminal fluid from 25 donors, and whole blood (10% final concentration). Glacial acetic acid was tested by spiking into PreservCyt-STM (10% final concentration). Samples with each interfering substance alone as well as samples spiked with *T. vaginalis* lysate to a final concentration of 0.01 TV/mL were tested.

Testing results yielded no false positive results for all substances tested (100% specificity).

No interference with the detection of *T. vaginalis* at concentrations of 0.01 TV/mL (≥ 95% sensitivity) was observed with any of the substances tested with the exception of Astroglide personal lubricant, porcine gastric mucus, and glacial acetic acid. Astroglide personal lubricant and glacial acetic acid did not interfere with the detection of *T. vaginalis* when tested at a concentration of 0.3 TV/mL (100% sensitivity). Porcine gastric mucus did not interfere with the detection of *T. vaginalis* when tested at a concentration of 1 TV/mL (100% sensitivity).

f. Detection Limit

Sensitivity panels were prepared with two strains of *T. vaginalis* (one Metronidazole-susceptible strain and one Metronidazole-resistant strain). Testing showed greater than 95% positivity in both strains of *T. vaginalis* for panels containing 0.01 TV/mL in PreservCyt liquid Pap specimen matrix and panels containing 0.003 TV/mL in swab specimen matrix.

g. Assay Cut-Off

The ATV Assay (Version 2) is designed for and validated on the PANTHER System. The assay test results are automatically interpreted by the PANTHER System APTIMA Trichomonas vaginalis software. A test result may be negative, positive or invalid as determined by the total Relative Light Units (RLU) in the detection step. A test result may be invalid due to RLU values outside the normal expected ranges. Initial invalid results should be retested.

Test Interpretation	Total RLU (x 1000)
Negative	0* to <100
Positive	100 to <2400
Invalid	0* or >/= 2400

*If the RLU measured on the PANTHER System is between 0 and 999, a result of "0" is reported in the "Total RLU (000s)" column in the run report. Measured RLU values less than 690 are reported as invalid. RLU values between 690 and 999 are reported as valid.

2. Comparison Studies

a. Performance characterization relative to an established patient-infected status algorithm.

See 3 (a) below

b. Matrix comparison

N/A

3. Clinical Studies

a. *Clinical Performance (Clinical Sensitivity and Specificity)*

Clinical performance of the ATV Assay on the PANTHER System was evaluated using leftover specimens collected from consenting subjects during a previous, prospective, multicenter clinical study of the ATV Assay on the TIGRIS DTS System. Symptomatic and asymptomatic women were enrolled from 9 US clinical sites, including obstetrics and gynecology, family planning, and STD clinics. Three (3) vaginal swabs, 1 endocervical swab, and 1 PreservCyt Solution liquid Pap specimen were collected from each subject. All specimens were clinician-collected.

PreservCyt liquid Pap specimens were collected with a broom-type device or a spatula and cytobrush. Two of the vaginal swab specimens were tested with a commercially available culture system and wet mount microscopic examination to establish infected status. The remaining specimens were prepared for APTIMA Trichomonas vaginalis Assay testing in accordance with the appropriate APTIMA specimen collection kit package insert instructions.

PANTHER System testing with the APTIMA Trichomonas vaginalis Assay was conducted at 3 sites (2 external laboratories and Gen-Probe) in accordance with package insert instructions.

Performance characteristics of the APTIMA Trichomonas vaginalis Assay were estimated by comparing results to a patient infected status algorithm. In the algorithm, the designation of a subject as being infected or non-infected with *T. vaginalis* was based on results from vaginal swab specimens tested by culture and/or wet mount microscopic examination. At least one of the reference test results was required to be positive to establish an infected patient status. Both reference tests were required to be negative to establish a non-infected patient status.

Twenty-three (23) APTIMA Trichomonas vaginalis Assay runs were initiated on the PANTHER System. Of these 23 runs, 1 (4.3%, 1/23) was aborted due to a fatal hardware error that led to a software failure. Specimens tested in the aborted run were retested. A total of 689 vaginal swab, 737 endocervical swab, and 791 PreservCyt Solution liquid Pap specimens were tested in the 22 valid runs. Of these specimens, 12 vaginal swab (1.7%, 12/689), 24 endocervical swab (3.3%, 24/737), and 29 PreservCyt Solution liquid Pap (3.7%, 29/791) specimens had initial invalid results due to hardware or software errors. Specimens with initial invalid results were retested. Eleven (11) vaginal swab (1.6%, 11/689), 24 endocervical swab (3.3%, 24/737), and 1 PreservCyt Solution liquid Pap (0.1%, 1/791) specimens had final invalid results due to hardware or software errors; these specimens were excluded from the analyses.

Results below show the sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of the ATV Assay and the prevalence of *T. vaginalis* in each specimen type. Performance was comparable across specimen types.

Table 2 below shows the sensitivity, specificity, PPV, and NPV of the APTIMA Trichomonas vaginalis Assay on the PANTHER System and the prevalence of *T. vaginalis* (based on the infected status) in each specimen type by symptom status and overall. Subjects were classified as symptomatic if symptoms were reported by the subject. Subjects were classified as asymptomatic if the subject did not report symptoms. Prevalence was higher in symptomatic women.

Table 2 - PANTHER System: Performance Characteristics of the APTIMA Trichomonas vaginalis Assay by Symptom Status

Specimen Type	Symptom Status	n	TP	FP[1]	TN	FN	Prev %	Sensitivity % (95% CI)[2]	Specificity % (95% CI)[2]	PPV % (95% CI)[3]	NPV % (95% CI)[3]
CVS	Asymptomatic	274	12	7[a]	255	0	4.4	100 (75.8-100)	97.3 (94.6-98.7)	63.2 (45.8-80.9)	100 (98.8-100)
	Symptomatic	393	57	4[b]	332	0	14.5	100 (93.7-100)	98.8 (97.0-99.5)	93.4 (84.9-98.1)	100 (98.9-100)
	All	667	69	11[c]	587	0	10.3	100 (94.7-100)	98.2 (96.7-99.0)	86.3 (77.9-92.6)	100 (99.4-100)
ES	Asymptomatic	309	18	5[d]	288	0	5.2	100 (80.6-100)	98.3 (96.1-99.3)	78.2 (58.1-90.8)	100 (98.9-100)
	Symptomatic	391	51	7[e]	333	0	13.0	100 (93.0-100)	97.9 (95.8-99.0)	87.9 (78.1-94.7)	100 (99.0-100)
	All	700	67	12[f]	621	0	9.6	100 (94.6-100)	98.1 (96.7-98.9)	84.8 (76.3-91.5)	100 (99.4-100)
PCyt	Asymptomatic	333	19	2[g]	312	0	5.7	100 (83.2-100)	99.4 (97.7-99.8)	90.5 (72.6-98.7)	100 (98.9-100)
	Symptomatic	441	64	8[h]	369	0	14.5	100 (94.3-100)	97.9 (95.9-98.9)	88.9 (80.4-94.9)	100 (99.1-100)
	All	774	83	10[i]	681	0	10.7	100 (95.6-100)	98.6 (97.4-99.2)	89.2 (82.0-94.5)	100 (99.5-100)

CI = confidence interval, CVS = clinician-collected vaginal swab, ES = endocervical swab, FN = false negative, FP = false positive, PCyt = PreservCyt Solution liquid Pap, Prev = prevalence, TN = true negative, TP = true positive.

[1] *T. vaginalis* NAAT results from a previous study (# positive results / # samples tested): a: 4/7, b: 3/4, c: 7/11, d 1/5, e: 2/7, f: 3/12, g: 0/2, h: 3/8, i: 3/10.

[2] Score confidence interval.

[3] PPV 95% confidence interval computed from the exact 95% confidence interval for the positive likelihood ratio. NPV 95% confidence interval computed from the exact 95% confidence interval from the negative likelihood ratio.

Table 3 below shows the sensitivity, specificity, PPV, and NPV of the APTIMA Trichomonas vaginalis Assay on the PANTHER System and the prevalence of *T. vaginalis* (based on the infected status) in each specimen type by collection site. For each specimen type, performance was similar across collection sites. Prevalence varied across collection sites, as expected.

Table 3: Performance Characteristics of the APTIMA Trichomonas vaginalis Assay by Collection Site

Site	Specimen Type	n	TP	FP	TN	FN	Prev %	Sensitivity (95% CI)[1]	Specificity (95% CI)[1]	PPV % (95% CI)[2]	NPV % (95% CI)[2]
1	CVS	52	8	1	43	0	15.4	100 (67.6-100)	97.7 (88.2-99.6)	88.9 (50.2-99.7)	100 (93.7-100)
	ES	53	9	2	42	0	17.0	100 (70.1-100)	95.5 (84.9-98.7)	81.8 (56.9-97.4)	100 (93.5-100)
	PCyt	59	11	0	48	0	18.6	100 (74.1-100)	100 (92.6-100)	100 (75.6-100)	100 (93.9-100)
2	CVS	52	3	1	48	0	5.8	100 (43.9-100)	98.0 (89.3-99.6)	75.0 (28.5-99.2)	100 (95.8-100)
	ES	56	4	1	51	0	7.1	100 (51.0-100)	98.1 (89.9-99.7)	80.0 (40.5-99.4)	100 (95.6-100)
	PCyt	68	5	0	63	0	7.4	100 (56.6-100)	100 (94.3-100)	100 (58.3-100)	100 (96.0-100)
3	CVS	12	2	0	10	0	16.7	100 (34.2-100)	100 (72.2-100)	100 (32.1-100)	100 (85.6-100)
	ES	16	2	0	14	0	12.5	100 (34.2-100)	100 (78.5-100)	100 (31.5-100)	100 (89.3-100)
	PCyt	17	2	1	14	0	11.8	100 (34.2-100)	93.3 (70.2-98.8)	66.7 (19.9-98.8)	100 (89.5-100)
4	CVS	41	7	1	33	0	17.1	100 (64.6-100)	97.1 (85.1-99.5)	87.5 (57.3-99.6)	100 (92.2-100)
	ES	41	7	0	34	0	17.1	100 (64.6-100)	100 (89.8-100)	100 (66.7-100)	100 (92.2-100)
	PCyt	43	7	1	35	0	16.3	100 (64.6-100)	97.2 (85.8-99.5)	87.5 (57.2-99.6)	100 (92.6-100)
5	CVS	145	1	0	144	0	0.7	100 (20.7-100)	100 (97.4-100)	100 (6.4-100)	100 (99.3-100)
	ES	162	1	0	161	0	0.6	100 (20.7-100)	100 (97.7-100)	100 (6.4-100)	100 (99.4-100)
	PCyt	167	1	0	166	0	0.6	100 (20.7-100)	100 (97.7-100)	100 (6.4-100)	100 (99.4-100)
6	CVS	67	10	2	55	0	14.9	100 (72.2-100)	96.5 (88.1-99.0)	83.3 (59.2-98.2)	100 (94.8-100)
	ES	80	13	4	63	0	16.3	100 (77.2-100)	94.0 (85.6-97.7)	76.5 (57.1-92.2)	100 (95.3-100)
	PCyt	92	20	3	69	0	21.7	100 (83.9-100)	95.8 (89.5-98.6)	87.0 (70.4-97.0)	100 (95.5-100)
7	CVS	173	18	3	152	0	10.4	100 (82.4-100)	98.1 (94.5-99.3)	85.7 (67.7-96.7)	100 (97.9-100)
	ES	161	12	3	146	0	7.5	100 (75.8-100)	98.0 (94.2-99.3)	80.0 (58.3-95.4)	100 (97.9-100)
	PCyt	194	18	4	172	0	9.3	100 (82.4-100)	97.7 (94.3-99.1)	81.8 (64.1-94.3)	100 (98.1-100)
8	CVS	80	10	2	68	0	12.5	100 (72.2-100)	97.1 (90.2-99.2)	83.3 (59.0-98.2)	100 (95.8-100)
	ES	83	9	2	72	0	10.8	100 (70.1-100)	97.3 (90.7-99.3)	81.8 (56.3-97.4)	100 (96.1-100)
	PCyt	86	9	0	77	0	10.5	100 (70.1-100)	100 (95.2-100)	100 (71.4-100)	100 (96.2-100)
9	CVS	45	10	1	34	0	22.2	100 (72.2-100)	97.1 (85.5-99.5)	90.9 (65.7-99.7)	100 (91.9-100)
	ES	48	10	0	38	0	20.8	100 (72.2-100)	100 (90.8-100)	100 (74.0-100)	100 (92.5-100)
	PCyt	48	10	1	37	0	20.8	100 (72.2-100)	97.4 (86.5-99.5)	90.9 (65.6-99.7)	100 (92.5-100)

CI = confidence interval, CVS = clinician-collected vaginal swab, ES = endocervical swab, FN = false negative, FP = false positive, PCyt = PreservCyt Solution liquid Pap, Prev = prevalence, TN = true negative, TP = true positive.

[1]Score confidence interval.

[2]PPV 95% confidence interval computed from the exact 95% confidence interval for the positive likelihood ratio. NPV 95% confidence interval computed from the exact 95% confidence interval from the negative likelihood ratio.

Table 4 shows the sensitivity, specificity, PPV, and NPV of the APTIMA Trichomonas vaginalis Assay on the PANTHER System and the prevalence of *T. vaginalis* (based on the infected status) in PreservCyt Solution liquid Pap specimens by cervical collection device. For PreservCyt Solution liquid Pap specimens, performance was similar across collection devices.

Table 4: Performance Characteristics of the APTIMA Trichomonas vaginalis Assay in PreservCyt Solution Liquid Pap Specimens by Collection Device Type

Collection Device	n	TP	FP	TN	FN	Prev %	Sensitivity (95% CI)[1]	Specificity (95% CI)[1]	PPV % (95% CI)[2]	NPV % (95% CI)[2]
Broom-type Device	414	54	5	355	0	13.0	100 (93.4-100)	98.6 (96.8-99.4)	91.5 (82.4-97.1)	100 (99.0-100)
Spatula/Cytobrush	360	29	5	326	0	8.1	100 (88.3-100)	98.5 (96.5-99.4)	85.3 (71.5-94.7)	100 (99.0-100)

CI = confidence interval, FN = false negative, FP = false positive, Prev = prevalence, TN = true negative, TP = true positive.
[1]Score confidence interval.
[2]PPV 95% confidence interval computed from the exact 95% confidence interval for the positive likelihood ratio, NPV 95% confidence interval computed from the exact 95% confidence interval from the negative likelihood ratio.

Agreement of APTIMA Trichomonas vaginalis Assay Results on the PANTHER System and the TIGRIS DTS System

It is recognized that device performance in an asymptomatic population is essential since the majority of individuals infected with *Trichomonas vaginalis* do not have symptoms. To further characterize performance of the assay in asymptomatic subjects, agreement between APTIMA Trichomonas vaginalis Assay results on the PANTHER System and the TIGRIS DTS System was assessed using prospectively collected specimens from asymptomatic subjects. Women were enrolled from 6 US clinical sites, including obstetrics and gynecology, family planning, and STD clinics. One (1) vaginal swab, 1 endocervical swab, and 1 PreservCyt Solution liquid Pap specimen were collected from each subject. All specimens were clinician-collected. PreservCyt liquid Pap specimens were collected with a broom-type device or a spatula and cytobrush.

APTIMA Trichomonas vaginalis Assay testing was conducted in accordance with the package insert instructions. PANTHER System testing was conducted at 3 sites (2 external laboratories and Gen-Probe). TIGRIS DTS System testing was conducted at Gen-Probe.

Eighteen (18) APTIMA Trichomonas vaginalis Assay runs were initiated on the PANTHER System; all were valid. A total of 227 vaginal swab, 227 endocervical swab, and 227 PreservCyt Solution liquid Pap specimens were tested. Of these specimens, 1 vaginal swab specimen (0.4%, 1/227) had an initial invalid result due to hardware error. The specimen with an initial invalid result was retested and had a valid result.

Of the samples with final valid APTIMA Trichomonas vaginalis Assay results on the PANTHER System, 227 vaginal swab, 227 endocervical swab, and 226 PreservCyt Solution liquid Pap specimens had valid, paired results on the TIGRIS DTS System.

Table 5 shows positive and negative percent agreements of APTIMA Trichomonas vaginalis Assay results on the PANTHER System and the TIGRIS DTS System in each specimen type for asymptomatic subjects.

Table 5: Agreement between APTIMA Trichomonas vaginalis Assay Results on the PANTHER System and the TIGRIS DTS System in Asymptomatic Subjects

Specimen Type	n	TIGRIS + PANTHER +	TIGRIS - PANTHER +	TIGRIS - PANTHER -	TIGRIS + PANTHER -	TIGRIS Positivity	% Positive Agreement (95% CI)[2]	% Negative Agreement (95% CI)[2]
CVS[1]	227	29	5	191	2	13.7	93.5 (79.3-98.2)	97.4 (94.2-98.9)
ES	227	28	1	198	0	12.3	100 (87.9-100)	99.5 (97.2-99.9)
PCyt	226	26	1	199	0	11.5	100 (87.1-100)	99.5 (97.2-99.9)

+ = positive, - = negative, CI = confidence interval, CVS = clinician-collected vaginal swab, ES = endocervical swab, PCyt = PreservCyt Solution liquid Pap.

[1]The 2 vaginal swab samples with positive APTIMA Trichomonas vaginalis Assay results on the TIGRIS DTS System and negative results on the PANTHER System were from subjects whose other samples had negative results on both the PANTHER System and the TIGRIS DTS System.

[2]Score confidence interval.

b.) *Clinical Reproducibility:*

The ATV Assay (Version 2) testing was conducted at 3 sites (in-house and 2 external) on the PANTHER System. Six operators, 2 at each site, performed reproducibility testing using 2 reagent lots over a period of at least 6 days. Four reproducibility panel members were prepared using a representative specimen matrix. The panels consisted of *Trichomonas vaginalis* negative and positive specimens prepared in PreservCyt solution. The panels included negative, high negative, moderate positive, and high positive samples. Identical panels were tested on 1 PANTHER System at each test site. Each run contained 3 replicates of each reproducibility panel member (12 PreservCyt samples total). Results are shown in the chart below (**Table 6**).

Table 6 – APTIMA Trichomonas vaginalis Assay Reproducibility Study

Conc	Target Conc (TV/mL)	N	Agmt (%)	Mean RLU	Between Sites		Between Operators		Between Lots		Between Runs		Within Runs		Totals	
					SD	CV (%)	SD	CV (%)	SD	CV (%)	SD	CV (%)	SD	CV (%)	SD	CV (%)
Neg	N/A	108	99.1	23.5	0.0	0.0	2.7	11.6	0.0	0.0	0.0	0.0	37.5	159.7	37.6	160.1
HNeg	0.003	108	90.7	69.3	5.0	7.3	4.5	6.5	6.1	8.8	14.8	21.4	16.0	23.1	23.6	34.1
MPos	0.02	108	97.2	348.1	30.3	8.7	33.1	9.5	33.1	9.5	77.0	22.1	62.9	18.1	114.0	32.8
HPos	1.00	108	100	1185.5	0.0	0.0	17.0	1.4	0.0	0.0	28.0	2.4	34.2	2.9	47.4	4.0

Agmt = agreement, Conc = concentration, CV = coefficient of variation, HNeg = high negative, HPos = high positive, MPos = moderate positive, Neg = negative, RLU = relative light units, SD = standard deviation.

Note: The RLU value reported by the software is the total measured RLU divided by 1000 with the digits after the decimal point truncated. Variability from some factors may have been numerically negative. This occurred if the variability due to those factors was very small. In these cases, SD and CV are shown as 0.

c. Expected Values and Reference Range

The prevalence of *T. vaginalis* in different populations depends on patient risk factors such as age, lifestyle, the presence or absence of symptoms, and the sensitivity of the test in detecting the infection.

The positivity rate for the ATV Assay (Version 2) by specimen type, collection site and overall was 11.8% (80/678) for vaginal swabs, 11.2% (80/713) for endocervical swabs and 11.8% (93/790) for PreservCyt specimens.

N. Instrument Name

The PANTHER System

O. System Descriptions:

a. Modes of Operation

Batch, random access

b. Specimen Identification

By handheld barcode reader and positional checks

c. Specimen Sampling and Handling

Fully Automated

d. Calibration

Gen-Probe Field Service Engineers perform a luminometer calibration on the PANTHER System every 12 months as part of the Preventive Maintenance. Also, there are process controls and calibration checks on all of the dispenses, thermal devices, and the vacuum system.

e. Quality Control

In addition to the assay controls that are specific to each assay, the PANTHER System contains process controls that employ both hardware and software components. The process controls include, but are not limited to:

- Verification that the sequence of assay processing steps is correct for each reaction.
- Verification that the reaction incubation times and temperatures are correct.
- Verification that reagents and fluids were appropriately dispensed.

P. Conclusion

The submitted information in this premarket notification demonstrates that the APTIMA Trichomonas vaginalis Assay on the PANTHER System is substantially equivalent to the predicate device.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
10903 New Hampshire Avenue
Document Control Center – WO66-G609
Silver Spring, MD 20993-002

JAN 09 2013

Gen-Probe Incorporated
C/O Maria Carmelita S. Baluyot
10210 Genetic Center Drive
San Diego, CA 92121-4362

Re: k122062
Trade/Device Name: APTIMA® Trichomonas vaginalis Assay (PANTHER® System)
Regulation Number: 21 CFR 866.3860
Regulation Name: Trichomonas vaginalis Nucleic Acid Amplification Test System
Regulatory Class: Class II
Product Code: OUY
Dated: December 27, 2012
Received: December 28, 2012

Dear Ms. Baluyot:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Part 801); medical device reporting (reporting of medical device-related adverse events) (21 CFR 803); good manufacturing practice requirements as set

forth in the quality systems (QS) regulation (21 CFR Part 820); and if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

If you desire specific advice for your device on our labeling regulation (21 CFR Parts 801 and 809), please contact the Office of *In Vitro* Diagnostics and Radiological Health at (301) 796-5450. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR Part 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to http://www.fda.gov/MedicalDevices/Safety/ReportaProblem/default.htm for the CDRH's Office of Surveillance and Biometrics/Division of Postmarket Surveillance.

You may obtain other general information on your responsibilities under the Act from the Division of Small Manufacturers, International and Consumer Assistance at its toll-free number (800) 638-2041 or (301) 796-7100 or at its Internet address http://www.fda.gov/cdrh/industry/support/index.html.

Sincerely yours,

Sally A. Hojvat

Sally A. Hojvat, MSc., PhD.
Director
Division of Microbiology Devices
Office of In Vitro Diagnostics and
Radiological Health
Center for Devices and Radiological Health

Enclosure

Indications for Use Form

510(k) Number (if known): K122062

Device Name: APTIMA® Trichomonas vaginalis Assay (PANTHER® System)

Indications for Use:

The APTIMA Trichomonas vaginalis Assay is an *in vitro* qualitative nucleic acid amplification test (NAAT) for the detection of ribosomal RNA (rRNA) from *Trichomonas vaginalis* to aid in the diagnosis of trichomoniasis using the PANTHER System.

The assay may be used to test the following specimens from symptomatic or asymptomatic women: clinician-collected endocervical swabs, clinician-collected vaginal swabs, and specimens collected in PreservCyt Solution.

Prescription Use ___X___ (Part 21 CFR 801 Subpart D)	AND/OR	Over-The-Counter Use _____ (21 CFR 801 Subpart C)

(PLEASE DO NOT WRITE BELOW THIS LINE-CONTINUE ON ANOTHER PAGE OF NEEDED)

Concurrence of CDRH, Office of In Vitro Diagnostic Devices (OIVD)

Tamara Feldblyum

Division Sign-Off
Office of In Vitro Diagnostic Device
Evaluation and Safety

510(k) K122062